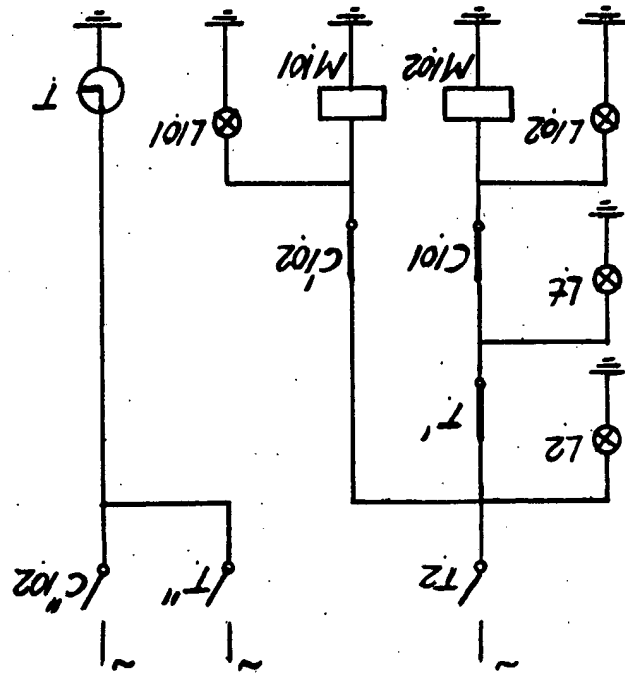


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557858

Fig. 5



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Patent No. 557,858

Method for Drying and Curing Tobacco

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4 Claims

This invention relates to drying and curing methods for tobacco more particularly to such a system for treatment of tobacco leaves with special means for remoistening.

It is generally known, that certain temperature and humidity conditions are favourable during the curing and drying period, and that the dried tobacco leaves must be remoistened to prevent excessive breakage. Usually barns are adapted for these processes, containing ducts of various designs for the distribution and circulation of air. Other systems employ conveyor belts to which the tobacco leaves are attached and expose the leaves to flows of warm air discharged from a plurality of nozzles.

Objects of this invention is a continuous process during which the tobacco leaves pass through several zones which are differently conditioned.

Another object of this invention is to provide a system, which is more efficient and easier to operate due to its compactness and the lack of mechanical conveyors.

A further object of this invention is the at least partial reuse of extracted water vapors for the remoistening of the dehydrated leaves.

These and other features and advantages will be apparent and illustrated by the following description and the accompanying drawings, representing a typical embodiment of the invention, wherein like parts are designated by the same numerals of reference in the different views:

Fig. 1 is an elevational view of an embodiment taken along line 1—1 of the corresponding Fig. 2.

Fig. 2 is a cross section of the same embodiment taken along line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken along the line 3—3 in the corresponding Fig. 1.

Fig. 4 is a detail of a carriage in enlarged scale.

Fig. 5 is a circuit diagram of a suitable interlocking system.

Referring more particularly to the drawings, in which 100 designates a tunnel with two sections A and B. In this tunnel 100 a number of carriages (shown as 1 to 15) are movable on tracks or conveyor. At one end the tunnel is accessible through a door 101 of any conventional type. Instead of the hinged door as shown sliding doors or overhead types might be used. This door 101 together with another door 102 forms an entrance lock, in which a carriage 1 can be separated. Adjacent to this lock is the before mentioned section A comprising a channel for the carriages 2 to 8 without any artificial air circulation; its walls are heated by means of an air jacket 110 or any other suitable system as warmwater pipes, electric heater elements etc., and preferably thermostatically controlled as to maintain a certain temperature distribution throughout its length. In the case of a warm air jacket, a manifold 112 (not shown) can be provided parallel to the warm air jacket with a plurality of ducts connected to different locations of the warm air jacket and 70

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having adjustable draft controls.

Such warm air jacket might be connected to preceding portions of tunnel B to form part of a duct system for circulation or removal of warm air utilized already otherwise.

Adjacent to section A is another section B containing the carriages 9 to 14 and forming a warm air tunnel for thorough drying. Warm air of an adjusted temperature is generated in a furnace 30; a motor-driven fan 31 forces the hot air to enter the tunnel near the perimeter of the carriage 14. After flowing through the carriages 14 to 9 the warm air is deflected in an exhaust manifold 115. Portions of the warm air may be allowed to enter the section A, being removed from there by means of adjustable registers 116, 117 or 118. This air already containing considerable quantities of water vapors is subjected to a roof ventilator 122, but the flow to it controlled by a throttle 120 in cooperation with another throttle 121 in the return duct 125. A certain amount of fresh air can be mixed with this returned air. This fresh air enters through an aspirator 24 with a throttle 26 and is supplied to the fan 31 and the furnace 30 together with the returned portions of air.

The process might also be conducted in such a way, that condensation of the extracted vapors takes place in cooler portions of the system. In these cases the condensate has to be atomized in the remoistener compartment by conventional means.

In order to control the influx of warm air from the zone B into zone A a removable louver may be installed between the carriages e.g., across the tunnel between the carriages 8 and 9.

The other end of the tunnel can be closed by two doors 135 and 136 in a similar way as the other side to provide another exit lock for the carriages 15, this last portion being not insulated because cooling of the carriage at this point is desirable. Additional means for artificial cooling can be installed to lower the temperature of the dehydrated leaves. Under the tracks a recess 50 forms a shallow tank with piping connected to a sewer system (not shown), with a plurality of nozzles 51 near the upper edge of the recess for discharge of humid air, steam or atomized liquids into the chamber.

For supply of saturated humid air an intake 70 is installed in the proximity of the boundary between zone A and B. Through a separate, heat insulated duct 72 the humid air flows to a fan preferably of the high-pressure centrifugal type and is then discharged through the nozzles 51.

41 denotes a second track for unloading, return and loading of carriages.

With reference to the numerals used for carriages, it is understood, that these numerals designate actually the positions of carriages during the different steps of the process and that each of the carriages passes cyclically through all these positions. These carriages as such consist of a frame structure 61 with a plurality of rods or rails to carry the tobacco leaves 60. A set of wheels 63 supports the frame for moving the carriages along the tracks. To close the space between the lower edge of the frame and the floor a flap 62 is provided being of resilient material or sheet metal hinged on.

In practical use and application of my invention, the furnace 30 and fan 31 have to be operated for a sufficient period of time, until stable temperature conditions are reached.

One of the carriages on track 41 is loaded with green leafs and passes through door 101. After door 101 is closed, the other door 102 is opened to enter the carriage in position 2. In order to enforce proper operation and equal treatment of the product an interlocking system for door 101 may be provided e.g., consisting of a thermo contact T2 to measure the temperature near position 2 and a time switch T, blocking door 102 for a predetermined period of time. Using this arrangement of conventional elements door 101 can be opened only, when door 102 is closed; but door 102 can be opened only, if door 101 is closed, the temperature at 2 is at a certain required amount and a given period of time has been elapsed since the last transfer of a carriage from position 1 to 2. Signal lights or acoustical signals can indicate that the transfer from 1 to 2 is due or a hydraulic cylinder can be operated to perform this step automatically.

In Fig. 5M 101, 102 denote latch magnets blocking the door 101 and 102 respectively. The time switch T actuates its contacts T', T'' during the preset period equal to the interval in which charges are admitted. Operating conditions of the lock are indicated by signal lights with the following meanings: L2 "temperature correct"; Lt "charge due"; L 101 "door 101 free"; L 102 "door 102 free". Control contacts C 101, C 102 are closed if the doors 101 and 102 respectively are in closed position. As soon as the minimum temperature near position 2 is reached, thermo contact T2 energizes both latch magnets M 101, M 102 and signal lights L2, Lt, L 101, L 102 indicating that a new charge might be entered into the lock. Opening of door 101 breaks the circuit through M 102, because of C 101 and keeps door 102 latched, light L 102 extinguishes accordingly. Transfer into position 2 is possible after closing door 101, which is latched as soon as door 102 is opened from the outside with a suitable remote control mechanism. This action starts time switch T, its contacts T' breaking the circuit through M 102 and holding itself through T'' as soon as door 102 is closed again.

New charges can be entered into the lock, because door 101 is unlatched, but transfer into position 2 must be delayed until the predetermined period of time T actually elapses and T' closes again.

In position 2 the carriage is exposed to moderate heat from the walls of the tunnel in stagnant air. Transfer from position 2 to 3 takes place as soon as a new carriage enters through the door 102. At position 3 and 4 the temperature is increasing as required for curing of the leafs. To compensate for the higher humidity at higher temperature a register 118 is provided in position 5 permitting a certain amount of air to be removed into the exhaust manifold 115.

In the following positions 6 and 8 a steady transition from the curing process in stagnant air to the drying condition at higher temperature and considerable air velocities must be attained. Increasing quantities of warm air are admitted and pass through the carriages towards the common exhaust 115.

It must be kept in mind, that the carriages progress from one position to the next one as a unit, all at the same time when and only when a

new carriage enters through the door 102. At the very same moment a completely treated carriage must be discharged through door 136 to give place for the following carriage. As already stated the time interval between two successive advancements should be fixed eventually by means of clockworks or time switches, therefore the drying effect during a given and always constant time interval depends entirely on temperature and air velocity.

To obtain a uniform product, the temperature and air velocity in section B between position 9 and 14 is kept constant. Considering the air velocity as constant in this section, the temperature raises towards 14, where hot air is blown in from the furnace.

In position 15 the carriage is exposed to cool temperature eventually with air circulation. After lowering the temperature conveniently, steam or water vapors are injected to remoisten the product before unloading. Automatic operation during this step requires only to control the circulation of cool air and as soon as the desired low temperature is attained predetermined quantities of steam or water vapors of given temperature are released. Condensate will be collected in tank 50 and drain off.

From the above disclosure it will be seen, that this system has special advantages in the use and operation and it will be provide efficient means for uniform treatment of products similar to tobacco leafs.

Also one typical and specific embodiment of the invention has been shown for purpose of illustration, it is evident that this system may be constructed in any suitable manner with a plurality of tracks or units working parallel or in opposite direction employing a common furnace, common remoisteners, programming devices and automatic controls for temperature, humidity and air velocities, with ducts under floor or mechanical operated conveyors, housed in a common heat insulated structure, with a plurality of observation windows in the different locations of the tunnel, to be used and operated by means of a train of carriages moving through a tunnel with different stationary temperatures and that various changes and modifications in size and proportion or design may be made in the above specifically described structure without departing from the spirit of the invention, the changes and modifications being restricted only by the scope of the following claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A process for treating tobacco, comprising moving individual loads of tobacco through a tunnel to subject the tobacco to increasing temperature but decreasing relative humidity, and finally bringing the tobacco into a zone of low temperature saturated with water vapors previously extracted from the tobacco.

2. A process as in Claim 1, wherein zones of lower temperature and stagnant air are indirectly heated by air already used for drying purposes in zones of higher temperature.

3. In apparatus for treating tobacco, a tunnel heat-insulated over most of its length and including a closed compartment at each end thereof, each of said compartments being closed by alternately-operating doors, means for moving the tobacco through said tunnel, sections of said tunnel having indirectly-heated wall portions, an adjust-

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able air heating system for forced air circulation through said sections a plurality of adjustable dampers for deflecting circulating air from said sections into a manifold, an adjustable ventilator, a return duct connected to said manifold and said ventilator, an adjustable fresh air intake connected to said return duct and to a blower, one of said compartments having cooling means, and means for introducing predetermined quantities of water vapor, said last means being connected to said tunnel and manifold at spaced intervals therealong.

4. Apparatus as in Claim 3, wherein said tobacco moving means includes carriages, each of said carriages comprising a frame having a plurality of

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supports for the tobacco, wheels supporting said frame, and a flap depending from said frame to close the space between said frame and the floor of said tunnel.

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